Task2: Predict optimum number of clusters from given 'iris' dataset

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In [ ]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn.cluster import KMeans
import seaborn as sns
```

In [ ]:
```
df=pd.read_csv("Iris.csv")
df.head()
```

Out[ ]:

	Id	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm	Species
0	1	5.1	3.5	1.4	0.2	Iris-setosa
1	2	4.9	3.0	1.4	0.2	Iris-setosa
2	3	4.7	3.2	1.3	0.2	Iris-setosa
3	4	4.6	3.1	1.5	0.2	Iris-setosa
4	5	5.0	3.6	1.4	0.2	Iris-setosa

In [ ]:
```
df.tail()
```

Out[ ]:

	Id	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm	Species
145	146	6.7	3.0	5.2	2.3	Iris-virginica
146	147	6.3	2.5	5.0	1.9	Iris-virginica
147	148	6.5	3.0	5.2	2.0	Iris-virginica
148	149	6.2	3.4	5.4	2.3	Iris-virginica
149	150	5.9	3.0	5.1	1.8	Iris-virginica

In [ ]:
```
df.count()
```

Out[ ]:
```
Id               150
SepalLengthCm    150
SepalWidthCm     150
PetalLengthCm    150
PetalWidthCm     150
Species          150
dtype: int64
```

In [ ]:
```
df.isnull()
```

Out[ ]:

	Id	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm	Species
0	False	False	False	False	False	False
1	False	False	False	False	False	False
2	False	False	False	False	False	False
3	False	False	False	False	False	False
4	False	False	False	False	False	False
...	...	...	...	...	...	...
145	False	False	False	False	False	False
146	False	False	False	False	False	False
147	False	False	False	False	False	False
148	False	False	False	False	False	False
149	False	False	False	False	False	False

150 rows × 6 columns

In [ ]:
```
df.isnull().sum()
```

Out[ ]:
```
Id               0
SepalLengthCm    0
SepalWidthCm     0
PetalLengthCm    0
PetalWidthCm     0
Species          0
dtype: int64
```

In [ ]:
```
df.columns
```

Out[ ]:
```
Index(['Id', 'SepalLengthCm', 'SepalWidthCm', 'PetalLengthCm', 'PetalWidthCm',
       'Species'],
      dtype='object')
```

In [ ]:
```
df.drop(columns='Id',axis=0)
```

Out[ ]:

	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm	Species
0	5.1	3.5	1.4	0.2	Iris-setosa
1	4.9	3.0	1.4	0.2	Iris-setosa
2	4.7	3.2	1.3	0.2	Iris-setosa
3	4.6	3.1	1.5	0.2	Iris-setosa
4	5.0	3.6	1.4	0.2	Iris-setosa
...	...	...	...	...	...
145	6.7	3.0	5.2	2.3	Iris-virginica
146	6.3	2.5	5.0	1.9	Iris-virginica
147	6.5	3.0	5.2	2.0	Iris-virginica
148	6.2	3.4	5.4	2.3	Iris-virginica
149	5.9	3.0	5.1	1.8	Iris-virginica

150 rows × 5 columns

In [ ]:
```
clustering_df=df.iloc[:,[0,1,2,3]]
clustering_df.head()
```

Out[ ]:

	Id	SepalLengthCm	SepalWidthCm	PetalLengthCm
0	1	5.1	3.5	1.4
1	2	4.9	3.0	1.4
2	3	4.7	3.2	1.3
3	4	4.6	3.1	1.5
4	5	5.0	3.6	1.4

In [ ]:
```
sse = []
for k in range(1, 11):
    kmeans = KMeans(n_clusters=k, random_state=42)
    kmeans.fit(df[['SepalLengthCm','SepalWidthCm','PetalLengthCm']])
    sse.append(kmeans.inertia_)
```

```
c:\Users\SAATVIKA\anaconda3\lib\site-packages\sklearn\cluster\_kmeans.py:870: FutureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n
_init` explicitly to suppress the warning
  warnings.warn(
c:\Users\SAATVIKA\anaconda3\lib\site-packages\sklearn\cluster\_kmeans.py:1382: UserWarning: KMeans is known to have a memory leak on Windows with MKL, when there are less chunks th
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  warnings.warn(
```
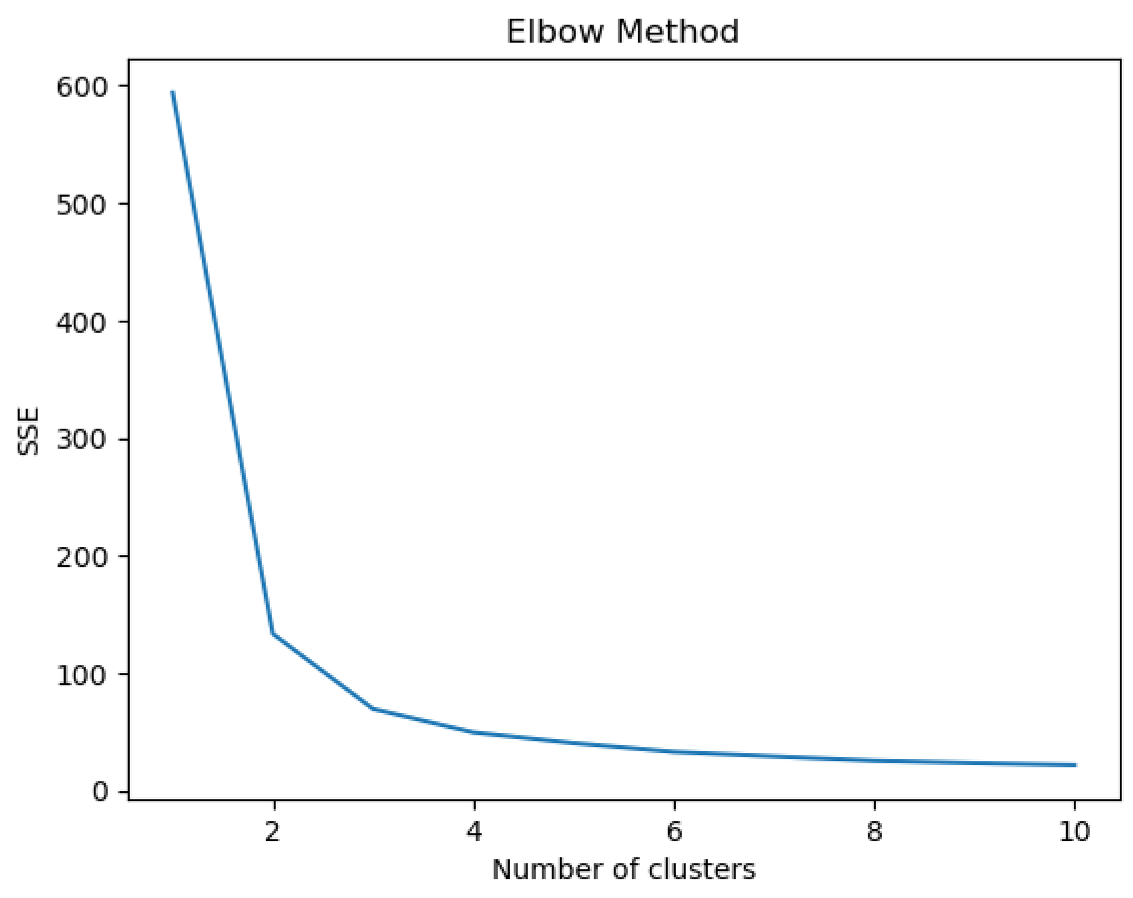

In [ ]:
```
plt.plot(range(1, 11), sse)
plt.title('Elbow Method')
plt.xlabel('Number of clusters')
plt.ylabel('SSE')
plt.show()
```



You can see why it's called 'Elbow Method'

In [ ]:
```
kmeans = KMeans(n_clusters=3, random_state=42)
kmeans.fit(df[['SepalLengthCm', 'SepalWidthCm','PetalLengthCm']])
df['cluster'] = kmeans.labels_
```

```
c:\Users\SAATVIKA\anaconda3\lib\site-packages\sklearn\cluster\_kmeans.py:870: FutureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n
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an available threads. You can avoid it by setting the environment variable OMP_NUM_THREADS=1.
  warnings.warn(
```
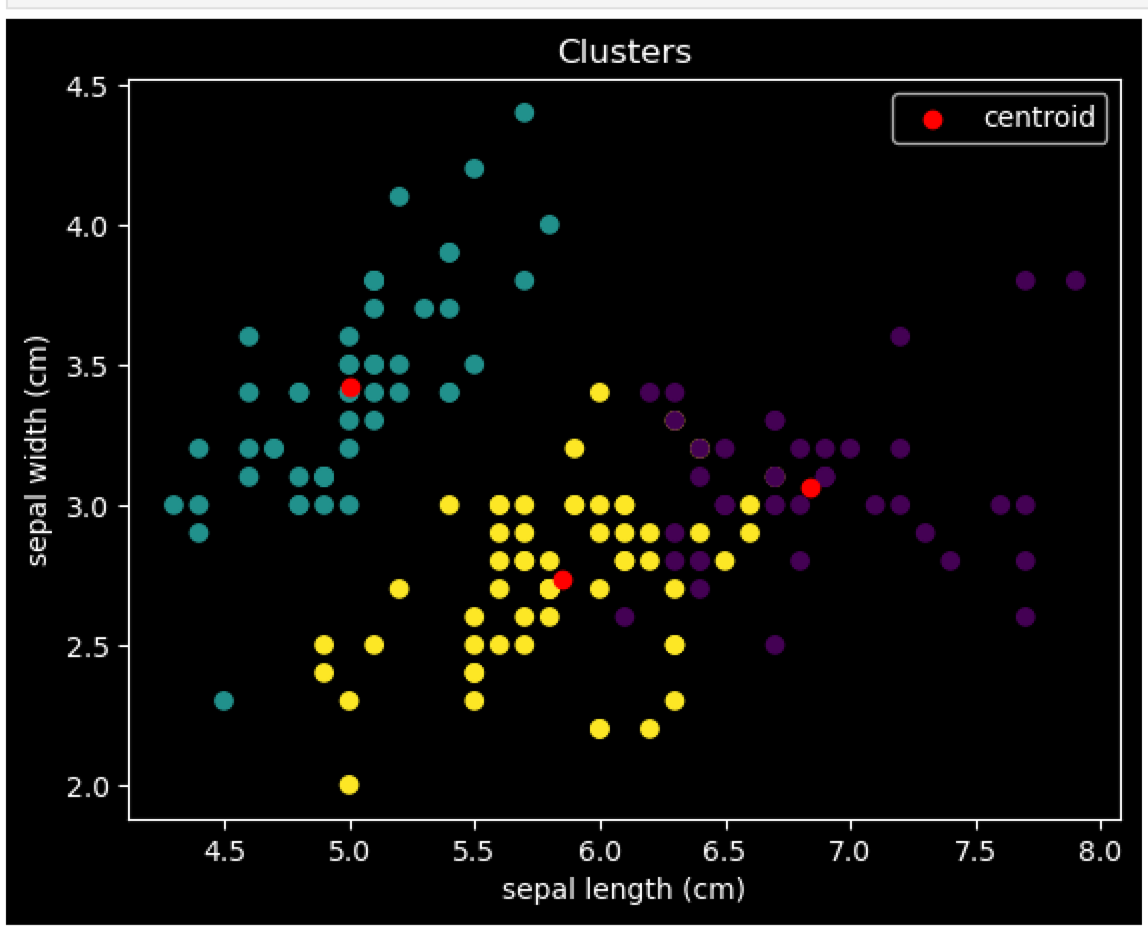

In [ ]:
```
plt.scatter(df['SepalLengthCm'], df['SepalWidthCm'],c=df['cluster'])
plt.title('Clusters')
plt.xlabel('sepal length (cm)')
plt.ylabel('sepal width (cm)')
plt.scatter(kmeans.cluster_centers_[:, 0], kmeans.cluster_centers_[:,1],c='red',label='centroid')
plt.legend()
plt.show()
```



Thankyou